

A Work Project, presented as a part of the requirements for the Award of a Master Degree in
Management from the NOVA – School of Business and Economics

Nudging healthier food choices:
The differentiated effect of implicit vs. explicit nudges

Joana Barros Marchão

3833

A project carried out on the Master in Management Program, under the supervision of:

Luís F. Martinez and Cátia Alves

Table of Contents

1. Introduction	4
2. Literature review	5
2.1. <i>An introduction to nudge in the health context</i>	5
2.2. <i>An introduction to specific nudge-type interventions</i>	6
2.2.1. <i>Background music – an implicit nudge</i>	6
2.2.2. <i>Social Norm – an explicit nudge</i>	8
2.3. <i>Understanding nudge effectiveness based on its implicit vs. explicit nature</i>	8
3. Methodology	11
3.1. <i>Participants and design</i>	11
3.2 <i>Stimuli, procedures and dependent measures</i>	11
3.2.1. <i>Pre-Study</i>	12
3.2.2. <i>Tasks</i>	13
4. Results	13
5. Discussion	17
5.1. <i>Theoretical and practical implications</i>	18
5.2. <i>Limitations and suggestions for future research</i>	19
References	21

Abstract

Behavioral sciences, and particularly nudges, are becoming increasingly relevant in the definition of policies designed to prompt desirable societal outcomes, namely in the health domain. This research studies the impact of two different nudge interventions in the choice of healthy food items: a social norm (with an explicit nature) and background music (sensory-based, with an implicit nature). The research also investigates the continued influence of these interventions in subsequent moments of choice. A digital experiment was conducted, and results confirm the strength of the social norm as an effective nudge. However, the proposed sensory-based nudge was not successful – future replication studies need to be conducted. Interestingly, we observe a consistency effect under the presence of either stimuli, meaning that people exposed to the stimuli perpetuate either the healthy or the unhealthy behavior in subsequent choices regardless of the nudge-type. Possible explanations and managerial implications are further explored.

Keywords

Nudge; Health; Food; Social Norm; Music

Acknowledgements

I would like to thank Cátia Alves and prof. Luís F. Martinez for their help and patience throughout this project. Finally, a word of appreciation to my family and to Rodrigo, for being my safe harbor.

1. Introduction

The technological revolution has pushed society forward in ways never seen before, but it hasn't come without its drawbacks. The modern society lifestyle has prompted the rise of serious public health problems, of which obesity is a notorious one. The World Health Organization has classified obesity as the global epidemic of the XXI century, transversal to nearly all age and socioeconomic groups (WHO, 2018). According to a recent study, the prevalence of overweight and obesity in Portugal are 39.1% and 28.6%, respectively, and researchers suggest that “public health interventions are urgently required for obesity prevention” (Gaio et al., 2017, p.2).

Ironically, many of the diseases endured by society derive from deliberate human choice and behavior (Marteau, Hollands, & Fletcher, 2012). In fact, obesity is the second largest cause of death that can be prevented, after smoking (Sérgio et al., 2005). These behaviors persist despite widespread knowledge of its implications for health. For this reason, there's been an increased concern about the way healthy eating campaigns have been implemented, and particularly about their efficacy in altering peoples' behavior since educational efforts and persuasive communication have shown disappointing results over time (Marteau et al., 2012; Ridder, 2014). An explanation widely discussed in the literature posits that health behavior (as most other behaviors) is essentially guided by unconscious responses, heuristic thinking, habit and impulses, and many times influenced by trivial environmental cues rather than strictly logical reasonings (Marchiori, Adriaanse, & Ridder, 2017; Ridder, 2014). As such, because health campaigns usually appeal to a reflective, effortful change of behavior requiring willpower, they turn out to be unsuccessful. Accordingly, several papers report adverse effects when consumers are primed with direct healthy cues – for instance, claiming a certain food product is healthy may ironically lead consumers to overindulge and increase food intake afterwards (Finkelstein & Fishbach, 2010; Provencher, Polivy, & Herman, 2009).

Different approaches have been tried out in an attempt to improve health campaigns and it seems that methods that work at the consumer's subconscious level might be a better solution (Benartzi et al., 2017; Marteau et al., 2012). Many of these methods are defined by the term *nudge* (Thaler & Sunstein, 2008) and are “meant to improve the directions of people's choices while maintaining freedom of choice” (Arno & Thomas, 2016, p.2). In other words, nudging is about “gently directing people to behave in the desired way” (Ridder, 2014, p.2).

Despite the promising effects of nudge-based approaches, there is still a clear lack of knowledge about their mechanisms of action, as well as the boundary conditions that ensure preservation of freedom of choice (Marchiori et al., 2017). To try to extend the knowledge on the subject, the present study examines the impact of two different stimuli (one more implicit/sensory-based – music – and another more explicit – social norm) on the immediate and subsequent choices of healthy food items, thereby sparking a discussion about the effects of different nudge-types in the short and medium/long-run.

2. Literature review

2.1. An introduction to nudge in the health context

Public policy makers have shown incremental interest on behavioral science techniques that build upon the unconscious nature of people's decision-making to pursue policy objectives (Benartzi et al., 2017). These techniques are described under the umbrella term *nudge*, defined by Thaler and Sunstein (2008, p.6) as “any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives”. Nudging is associated with the ‘libertarian paternalism’ movement – envisioned by the same authors – as it subtly directs behavior through the power of suggestion, but keeps the freedom of choice intact by letting all alternative choices available (Ridder, 2014; Thaler & Sunstein, 2008). A relevant perk of nudge interventions is the relative easiness with which they are implemented, both in terms of processes and costs. In fact, a successful nudge

may only require a subtle change of the choice architecture or a simple environmental cue and on top of that, nudges often show more favorable impact-to-cost ratio than traditional interventions (Benartzi et al., 2017).

In the health domain, many nudge interventions have been conducted with success. For example, increasing the distance of unhealthy food items in a buffet reportedly decreases the intake significantly (Maas, Ridder, Vet, & Wit, 2011; Rozin, Scott, & Dingley, 2011). Within the context of a store, marketing strategies may simply consist on increasing the availability, affordability, prominence and promotion of healthful foods or de-marketing unhealthy foods (Glanz, Bader, & Iyer, 2012). Some examples are the following: changing the assortment structure of (un)healthy foods on shelf space (Kleef, Otten, & Trijp, 2012); placing healthy displays near the checkout counter (Kleef et al., 2012); visually dividing a shopping cart (Wansink, Soman, & Herbst, 2017); placing healthy items near the front entrance of the store; displaying fruit in an attractive way with a decorated frame around it, among others (Wansink, 2017). More recently, a lateral shelf display pattern ‘healthy-left, unhealthy-right’ was seen to enhance ease of process and consequently increase the likelihood of choosing healthy items (Romero & Biswas, 2016).

2.2. An introduction to specific nudge-type interventions

Felsen, Castelo, & Reiner (2013) propose a distinction between what they call ‘covert’ and ‘overt’ influences on decisions (nudges). These differ based on the target’s degree of awareness about them and his ability to consciously process them, which is higher for overt nudges. In the context of the present research, we will refer to the term ‘covert’ as ‘implicit’ and to the term ‘overt’ as ‘explicit’.

2.2.1. Background music – an implicit nudge

Retail atmospherics are becoming an important strategic tool to provide optimal in-store experiences for customers (Biswas, Lund, & Szocs, 2018). Sensory marketing techniques have

been evolving and research shows that different sensory atmospherics can affect shoppers' perceptions and behaviors (Spence, Puccinelli, Grewal, & Roggeveen, 2014). For example, manipulating the light (Biswas, Szocs, Wansink, & Chacko, 2017) or temperature (Zwebner, Lee, & Goldenberg, 2013) of the retail environment has been proved to influence behavior.

Among all the variables that can be manipulated, sound is one of the most used by retailers. A meta-analysis on the topic revealed that environments in which music is present yield higher pleasure, satisfaction and behavioral intention (Roschk, Loureiro, & Breitsohl, 2017). Experimental research corroborates this finding by revealing that in-store background music can be used to elicit a positive mood, leading consumers to evaluate situations more positively and as a result influence behavior and increase sales (Groenland & Schoormans, 1994; Gustafsson, 2012). Specific music characteristics may impact behavior differently, for example, slow music results in a slower rhythm of in-store traffic, increased sales volume (Milliman, 1982) and longer time spent in the retail venue (Garlin & Owen, 2006; Michel, Baumann, & Gayer, 2017). In the health context, research shows that “low-volume music/noise leads to increased sales of healthy foods due to induced relaxation” (Biswas et al., 2018, p. 1).

Based on these findings, we propose the use of background music as a new health-related nudge intervention that has a higher unconscious nature (sensory-based stimulus). Previous research in the marketing field show that congruency between sense and environment is important. For example, in-store music-brand fit is an important signaling cue to the brand's positioning, image and quality (Beverland, Elison Ai Ching, Morrison, & Terziovski, 2006). Congruency between sound and specific products or product categories may help direct attention towards a target amongst other visually distracting products (Knöferle, Knöferle, & Velasco, 2016). The fit between product and music was tested in a supermarket where sales of French wines increased when French music was played and the same happened for German music and the respective wines; interestingly, consumers were unaware of the effect of music

on their product choices (North, Hargreaves, & Mckendrick, 1999). These findings, allied to an emerging trend that values freshness and naturality as the most relevant healthy food attributes (Berry, Burton, & Howlett, 2017; Román, Sánchez-Siles, & Siegrist, 2017), lead us to the hypothesis that music that resembles the sounds of nature may be an effective (and rather implicit) health-related nudge.

H1: Nature-resembling music is an effective health-related nudge.

2.2.2. Social Norm – an explicit nudge

Social norms – i.e., social frames of reference: conventions, customs, stereotypes and other criteria of conduct (Sherif, 1936) – are one of the most famous nudge-based interventions. They have been successfully used in several contexts – for example, as a way to decrease energy consumption (Allcott, 2011), diminish inappropriate antibiotic prescriptions (Meeker et al., 2016) or increase towel reuse in hotels (Cialdini & Griskevicius, 2008). Similarly, social norm interventions held in retail settings with the purpose of motivating healthy eating habits have also achieved successful outcomes – for example, a norm revealing the average consumption of fruits and vegetables in a given supermarket resulted in a 10% increase in sales of those products (Payne, Niculescu, Just, & Kelly, 2014). This is justified by the construct of social identity, which stems from comparisons with others and helps determine consumption decisions (Burson & Gershoff, 2015). Consumers show a tendency to conform and be aligned with their peers' eating patterns (Prinsen, Ridder, & Vet, 2013), and thus choose to buy foods that they perceive as being normal or popular to purchase (Wansink, 2017).

2.3. Understanding nudge effectiveness based on its implicit vs. explicit nature

Some nudge types seem to be more effective than others (Cadario & Chandon, 2018). Their different success rates may be related to their diverse persuasion strategies, as well as their level of salience. An important dimension to be considered is the nature of the nudge's influence on the decision: implicit (or covert) vs. explicit (or overt) (Felsen et al., 2013). As

previously mentioned, one could argue that a social norm has a more salient or explicit nature compared to changes on shelf disposal in canteens or supermarkets. We are suggesting that different intervention-types have different action modes based on their implicit or explicit nature (i.e., based on the decision maker's degree of awareness about the nudge and his ability to consciously process it).

The extent to which a nudge needs to be processed outside of conscious awareness to be effective is still unclear. On the one hand, some studies on resistance to persuasion suggest that disclosing a nudge intention may jeopardize the outcome by inciting reactance and counter-responses resulting from feelings of manipulation and restrained freedom (Campbell, Mohr, & Verlegh, 2013; Jonge, Zeelenberg, & Verlegh, 2018; Wood & Quinn, 2003). For example, the persuasion knowledge model posits that people respond differently to persuasion attempts based on their personal knowledge about the agent's goals and tactics and how to cleverly cope with them (Friestad & Wright, 1994). On the other hand, other researchers suggest that highlighting nudge intentions not only does not affect effectiveness (Bang, Shu, & Weber, 2018; Kroese, Marchiori, & Ridder, 2015), but also may even enhance it (Marchiori et al., 2017). In fact, some studies where the use of default options as nudges was disclosed to participants did not turn out less influential (Bruns, Kantorowicz-reznichenko, Klement, Jonsson, & Rahali, 2018; Loewenstein, Bryce, Hagmann, & Rajpal, 2015; Steffel, Williams, & Pogacar, 2016). It seems that, at least in some contexts, transparency (i.e., the understanding of the nudge's intention) can be promoted without sacrificing effectiveness (Krijnen, Tannenbaum, & Fox, 2017). Additionally, research shows that, in general, people appreciate honesty and transparency (Krijnen et al., 2017; Steffel et al., 2016) and are more acceptant of conscious decisional enhancement interventions than of unconscious decisional enhancement, namely in the eating context (Felsen et al., 2013). In particular, nudges designed for improving

collective well-being – related to sustainability or public health, for example – have higher acceptability (Bang et al., 2018)

Most of these findings seem to defend a positive effectiveness of explicit-based nudges. Consequently, we argue that given the more explicit nature of the social norm, consumers are able to easily infer its purpose in the experiment; because the inferred purpose is aligned with a goal that has a positive connotation – eating healthy –, we hypothesize that participants in this condition will accept the nudge, ‘cooperate’ more and choose healthier than the participants exposed to music – a stimulus that presents a weaker link to the health goal. Adding to this is the fact that there is ample evidence that social comparison is indeed a very strong influencer of eating behaviors (Higgs, 2014), whereas little information is available on the strength of sensory stimulus in the eating context. Thus, we propose the following hypothesis:

H2: The nudge explicit intervention – social norm – will have a greater impact than the nudge implicit intervention – music – in influencing the choice of a healthy option.

While there is extended literature on the impact of nudge interventions on a single consumption decision, the long-term effect of the nudge (that is, the continuous impact of the same stimuli on subsequent choices) is typically not studied. Is a health-related nudge still effective when a consumer needs to make more than one decision? Or perhaps can a nudge revert unhealthy behavior in a later decision opportunity?

We intend to explore these questions by analyzing the effect of the stimuli on a second moment of choice. Literature shows that some people strive for consistency and thus, when they are primed with a healthy stimulus and go for a healthy product choice, they tend to decrease subsequent unhealthy product purchases to behave in accordance with the healthy setting (van Kampen, 2018), which can generate feelings such as pride (Mukhopadhyay & Johar, 2007). Another explanation points at a compensation effect, meaning that an increase in healthy consumption is followed by a compensating increase in unhealthy consumption

(Wisdom, Downs, & Loewenstein, 2010), which might be explained by the self-licensing theory (Hui, Bradlow, & Fader, 2009; Khan & Dhar, 2006; Wilcox, Vallen, Block, & Fitzsimons, 2009) or, even, the need to seek for dissimilar experiences (Laran & Buechel, 2016).

We argue that the conflicting results reported in the literature derive from the fact that they do not account for the type of nudge being presented. We hypothesize that depending on the nature of the nudge, the behavior in subsequent choices will vary.

H3: Different nudge types – explicit vs. implicit – will prompt different response behaviors – consistent or compensatory – in subsequent choices.

3. Methodology

3.1. Participants and design

One hundred and ninety participants were initially recruited to answer a digital experiment to test the impact of different health-related stimuli on their preference for healthy and unhealthy food items. Due to technicalities discussed below, the total sample was reduced to 153 participants in the end (107 female; $M_{age} = 34.5$; $SD = 14.3$). Participants were of Portuguese nationality and were randomly assigned to one of three different experimental conditions. The experiment was conducted through an online Qualtrics survey. The study was conducted in Portuguese language.

3.2 Stimuli, procedures and dependent measures

The experiment included three experimental conditions: an explicit condition in which subjects were exposed to a health-related social norm stating that *59% of the Portuguese population affirms to eat healthy very often*¹ (Marktest, 2016); an implicit condition in which subjects were exposed to background nature-resembling music consisting of birds and water

¹ In the original language: *59% da população Portuguesa afirma fazer uma alimentação saudável muito frequentemente.*

sounds; and a control group in which no stimulus was presented. At the end there were 59 respondents in the control group, 63 in the social norm condition and 68 in the music condition. However, in the latter condition only 31 respondents affirmed having listened to music while answering to the questionnaire. We assume there was a technical problem and that music did not play in some cases – the stimulus was not presented. For this reason, only 31 participants were considered valid for analysis in the music condition and in the end the final sample consisted of 153 participants only.

Participants were presented with an initial message stating they were going to be involved in a study about Portuguese gastronomy with the purpose of better understanding day-to-day food preferences in Portugal.

3.2.1. Pre-Study

The experiment included two sets of recipes (one for main dishes and another for desserts) containing both healthy and unhealthy items. To assure that the groups of healthy recipes and the group of unhealthy recipes were framed equally appealing/tasteful and that recipes intended to be (un)healthy were in fact perceived as such, a *pre-study* was conducted to validate the list. Thirty-eight participants assessed each recipe as to its degree of flavor/attractiveness and healthfulness using semantic differential scales (Malhotra, 2009). Results were analyzed using one-way ANOVAs. As intended, the group of healthy recipes and the group of unhealthy recipes differed in terms of perceived healthfulness for both main dishes, $F(1,302) = 375.873, p < .001$ and desserts, $F(1,226) = 166.075, p < .001$. Regarding the attractiveness/flavor of the recipes, the group of healthy recipes was considered as appealing as the group of unhealthy recipes, for both main dishes, $F(1,302) = .921, p = .338$ and desserts, $F(1,226) = .977, p = .324$.

3.2.2. Tasks

The first main task concerned the choice of a main dish and the second main task concerned the choice of a dessert. The list of recipes included the name of the dish and the respective set of ingredients. In addition, the survey included filler tasks to distract participants from the main purpose of the study – healthy vs. unhealthy behaviors –, as well as questions assessing the participants' awareness of the stimulus presented to them (either the social norm or the music). Subjects were also asked about demographic data and their health motivation. Health motivation was measured using a 7-item scale composed of seven affirmations adapted from Moorman (1990) and Moorman and Matulch (1993) (see appendix). Because the original scale was written in English and the present study was conducted in Portuguese, the scale was translated through the procedure of translation and back-translation (Brislin, 1986; Triandis & Brislin, 1984). To assign a level of health motivation to each participant, the mean value of the punctuations given to the seven affirmations was calculated to each participant, transforming health motivation into a continuous variable.

4. Results

The data were analyzed using binary logistic regressions. This type of regression is used when the dependent variable is binary. It assumes a linear relationship between the logit (also referred to as the log odds) of the response (i.e., the likelihood that the dependent variable assumes value 1) and the explanatory variables.

The first part of the analysis aimed at understanding what variables better explain the choice of a healthy option for the main dish. The dependent variable then assumes value 1 if the participant chooses a healthy item and value 0 if he chooses an unhealthy item. Two models were estimated: one including a dummy variable for the music condition (contrasted against the control group) and another including a dummy variable for the social norm condition (also contrasted against the control group). Health motivation was included as a variable because it

has been appointed as a relevant moderator of health behavior. Moorman and Matulich (1993, p.210) define it as “consumers’ goal-directed arousal to engage in preventive health behaviors”.

Table 1. Logistic regression of experimental condition and health motivation on the choice of a healthy main dish.

Explanatory Variables	B	Odds ratio	<i>p</i>
Model 1			
Constant	-3.500	.030	.009
Music	.033	1.034	.946
Health Motivation	.781	2.183	.002
Model 2			
Constant	-2.382	.092	.038
Social Norm	.741	2.097	.079
Health Motivation	.566	1.761	.008

Note. ‘Control group’ is the base level in the dummy-variables representing the experimental conditions.

Results show that while being exposed to music did not have a relevant effect in the choice of a healthy main dish (Wald (1) = .005; $p = .946$), being exposed to a social norm showed to be a more relevant predictor of such behavior, considering a level of significance of 10% (Wald (1) = 3.077; $p = .079$). In logistic regressions, the coefficient B does not have a direct interpretation because it represents the change in the log odds of the dependent variable resulting from a change in the explanatory variables. Instead, we use the odds ratio (the exponential of B), which shows how much the odds of an outcome occurring increase (or decrease) when there is a change in the associated explanatory variable. This means that a participant in the social norm condition is 2.097 times more likely to choose a healthy option as a main dish than a participant in the control group. As expected, health motivation also proved to be a significant explanatory variable with a positive effect in both models, meaning that an increase of one unit in the health motivation scale is associated with an increased likelihood of choosing healthy food (2.183 more likely in Model 1 and 1.761 more likely in Model 2).

This analysis leads us to the **rejection of H1**, as the music-resembling stimulus did not turn out to be an effective nudge, and to the **confirmation of H2**, as being exposed to the social norm was found to be more effective in influencing behavior.

The second part of the analysis aimed at understanding if the participants' behavior when making a choice for a second time – by picking a dessert – was somehow influenced by their first choice for the main dish (healthy vs. unhealthy), their experimental condition and the joint influence of both these variables. In order to do so, we first investigated subsequent choice when the participant had chosen for the main dish a healthy option (choice of main dish coded as 1 if the choice was **healthy** and 0 if the choice was **unhealthy**). Two binary logistic models were estimated – one for each condition –, and health motivation was introduced again as an explanatory variable.

Table 2. Logistic regression of experimental condition, first choice of a healthy main dish and health motivation on the choice of a healthy dessert.

Explanatory Variables	B	Odds ratio	<i>p</i>
Model 1			
Constant	-.030	.971	.982
Music	-1.737	.176	.033
Main dish [healthy]	-.351	.704	.552
Music * Main dish [healthy]	3.463	31.920	.003
Health Motivation	.147	1.158	.559
Model 2			
Constant	-1.116	.328	.327
Social Norm	-1.684	.186	.026
Main dish [healthy]	-.486	.615	.412
Social Norm * Main dish [unhealthy]	2.488	12.037	.006
Health Motivation	.369	1.446	.084

Note. 'Control group' is the base level in the dummy-variables representing the experimental conditions and 'Not Healthy' is the base level in the dummy-variable representing the choice of main dish.

Results show that the nature of the choice for the main dish (healthy vs. unhealthy) *per se* has no significant influence in the choice of a healthy dessert. Looking into the effect of the experimental conditions alone, we can verify that both the music (Wald (1) = 4.521; $p = .033$) and the social norm (Wald (1) = 4.932; $p = .026$) are significant and with negative effects ($B < 0$). This means that participants exposed to music or the social norm are strangely less likely to choose a healthy dessert than participants in the control group. However, the interaction between these two variables is significant and with a positive effect. This means that participants who were exposed to either music or the social norm **and** chose a healthy main dish (Wald (1) = 8.989; $p = .003$ and Wald (1) = 7.609; $p = .006$, respectively) are more likely to choose a healthy dessert. By this analysis we can conclude that people tend to be consistent and commit to a healthy choice in a subsequent occasion of choice under the effect of the stimuli. Once again, and as expected, health motivation has a positive effect on the choice of healthy desserts in both models.

Finally, we replicated this analysis targeting instead participants who had chosen for the main dish an unhealthy option (this is done by reverting the coding of the variable: choice of main dish coded as 1 if the choice was **unhealthy** and 0 if the choice was **healthy**).

Table 3. Logistic regression of experimental condition, first choice of an unhealthy main dish and health motivation on the choice of a healthy dessert.

Explanatory Variables	B	Odds ratio	p
Model 1			
Constant	-0,381	0,683	0,789
Music	1,726	5,617	0,035
Main dish [unhealthy]	0,351	1,42	0,552
Music * Main dish [unhealthy]	-3,463	0,031	0,003
Health Motivation	0,147	1,158	0,559

Explanatory Variables	B	Odds ratio	<i>p</i>
Model 2			
Constant	-1,602	0,201	0,189
Social Norm	0,804	2,234	0,097
Main dish [unhealthy]	0,486	1,626	0,412
Social Norm * Main dish [unhealthy]	-2,488	0,083	0,006
Health Motivation	0,369	1,446	0,084

Note. ‘Control group’ is the base level in the dummy-variables representing the experimental conditions and ‘Healthy’ is the base level in the dummy-variable representing the choice of main dish.

Results show that the interaction between the experimental condition and the choice for the main dish is significant in both models (Wald (1) = 8.989; $p < .05$ for Model 1; Wald (1) = 7.609; $p < .05$ for Model 2). The effect of these explanatory variables is negative, meaning that participants who chose an unhealthy main dish **and** were exposed to one of the stimuli are less likely to choose a healthy dessert than participants who chose an unhealthy main dish and were assigned to the control group. Health motivation had again a positive effect on the choice of a healthy dessert.

We can then **reject H3** – there is no apparent difference between the effect of the two stimuli in influencing the subsequent choice. In fact, both stimuli prompt consistent behavior – the choice of an (un)healthy main dish under the effect of either stimuli is followed by the choice of an (un)healthy dessert.

5. Discussion

Behavioral sciences are becoming increasingly relevant in the definition of public policies around the world, with governments using behavioral insights as a complement to or even replacement of traditional policies, which usually rely on economic incentives. In fact, a number of governments have created ‘nudge units’ formed by experts whose job is to define interventions able to encourage desirable societal behavior (Benartzi et al., 2017) – for example, England has one of the most advanced units, the Behavioral Insights Team (BIT). However, up

to this date there is still some lack of clarity about how nudges work and under what conditions they are in fact effective.

The current research contributes to the topic by proposing a new health-based sensory nudge, as well as by sparking a discussion about the impact of nudges on subsequent choices, specifically in the health context. If we think of a retail setting, for instance, it may be useful to understand if a nudge intervention is able to impact the overall healthiness of a basket of goods or if the choice of some healthy goods is then balanced with the choice of unhealthy goods, leaving the overall healthiness of the basket intact. This dynamic is what our experiment intended to study in a simplistic way.

5.1. Theoretical and practical implications

A first result to be considered is the fact that, contrary to what was expected, the nature-resembling music – a novel nudge suggestion – did not turn out to be an effective nudge at a first moment of choice (H1 was rejected). Different explanations may account for this fact: the stimulus may be too implicit to generate a response; the link between nature and healthfulness may have been overrated; or even the particularities of the music presented – birds and water sounds – may not be appropriate to activate a mood congruent with the concept of healthy eating. The most probable explanation, however, is the small sample size, as due to technical issues only 31 participants were assigned to the music condition in the end, making the data analysis less robust. The social norm unsurprisingly proved to be an effective nudge, aligned with the literature on the subject (H2 was accepted). We argue that the more explicit nature of this stimulus and its alignment with a purpose commonly accepted as positive – improving health – lead participants to accept the nudge; additionally, social standards have been long seen to influence even the most basic human needs, such as eating (Sherif, 1936). This is a valid insight not only for policy makers, but also for marketers, who can and should emphasize commonplace features of purchase and consumption when marketing their products and brands.

Another main finding of the research is that consumers tend to behave consistently in subsequent choices under the effect of either stimuli – that is, consumers exposed to the stimuli perpetuate the healthy or the unhealthy behavior in a subsequent choice regardless of the nudge-type (H3 was rejected). This consistency effect may be simplistically explained by the fact that “at all levels of information processing in the brain, neural and cognitive structures tend toward a state of consistency” (van Kampen, 2018, p.1). When the nudge is effective at a first moment of choice, it might create a certain mood that inhibits one’s predisposition to engage in subsequent discrepant behaviors/choices. When the opposite happens, and the nudge does not work at a first moment of choice, this might be due to a reactance response (resulting from a feeling of manipulation, for example, or even extended persuasion knowledge) that is then sustained throughout the subsequent set of choices, resulting in a consistent ‘rejection’ behavior under the influence of the stimulus. In practice, this means that if an intervention manages to get consumers to opt for a healthy item at a first moment of choice, then a nudge can be effective in sustaining healthier preferences later on. This brings to the discussion a longer-term perspective of nudge interventions that policy makers should consider when designing them – that is, they should try and make sure that a nudge is effective at a first moment of choice, thereby managing to influence subsequent decisions.

5.2. Limitations and suggestions for future research

These results need to be taken with caution as the research presents a set of limitations that may have impacted the analysis. Besides the sample size, which has been addressed above, there are intrinsic factors that may moderate the choice of healthy versus unhealthy food items that were not accounted for in the experiment: social class, education level, dieting status, among others. Specifically, we could not account for the effect of gender because there was a disparity in the distribution of gender in the sample (107 females to 46 males), which would have made the analysis of this effect biased. Additionally, even though we accounted for the

overall perception of healthfulness and tastiness of the dishes and desserts featured in the experiment, strong preferences for specific dishes (resulting from associations with family, childhood memories, festivities, etc.) may have dictated some of the choices. Finally, the methodology used also presents its limitations. The disadvantages of using online surveys (instead of experimental methods) are well-known and include responses biased by beliefs of what is the socially desirable answer, contamination of responses from discussion with others (Saunders, Lewis, & Thornhill, 2016) and unwillingness or lack of ability to respond to certain questions – for example, due to lack of conscious awareness about motivation, feelings, etc. (Malhotra, 2009). Further research is needed to deepen the knowledge about the nudge phenomena and its long-term influence on behavior. In particular, future research should investigate the impact of music in influencing health behavior.

References

- Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, 95(9–10), 1082–1095. <https://doi.org/10.1016/j.jpubeco.2011.03.003>
- Arno, A., & Thomas, S. (2016). The efficacy of nudge theory strategies in influencing adult dietary behaviour: a systematic review and meta-analysis. *BMC Public Health*, 1–11. <https://doi.org/10.1186/s12889-016-3272-x>
- Bang, H. M., Shu, S. B., & Weber, E. U. (2018). The role of perceived effectiveness on the acceptability of choice architecture. *Behavioural Public Policy*, 1–21. <https://doi.org/10.1017/bpp.2018.1>
- Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., Galing, S. (2017). Should Governments Invest More in Nudging? *Psychological Science*, 28, 1041–1055. <https://doi.org/10.1177/0956797617702501>
- Berry, C., Burton, S., & Howlett, E. (2017). It's only natural: the mediating impact of consumers' attribute inferences on the relationships between product claims, perceived product healthfulness, and purchase intentions. *Journal of the Academy of Marketing Science*. <https://doi.org/10.1007/s11747-016-0511-8>
- Beverland, M., Elison Ai Ching, L., Morrison, M., & Terzioviski, M. (2006). In-store music and consumer–brand relationships: Relational transformation following experiences of (mis) fit. *Journal of Business Research*, 59, 982–989. <https://doi.org/10.1016/j.jbusres.2006.07.001>
- Biswas, D., Lund, K., & Szocs, C. (2018). Sounds like a healthy retail atmospheric strategy: Effects of ambient music and background noise on food sales. *Journal of the Academy of Marketing Science*.
- Biswas, D., Szocs, C., Wansink, B., & Chacko, R. (2017). Shining light on atmospherics: how ambient light influences food choices. *Journal of Marketing Research*, 54(1), 111–123.

- Brislin, R. W. (1986). The wording and translation of research instruments. In *Field methods in cross-cultural research* (pp. 137–164).
- Bruns, H., Kantorowicz-reznichenko, E., Klement, K., Jonsson, M. L., & Rahali, B. (2018). Can nudges be transparent and yet effective? *Journal of Economic Psychology*, 65, 41–59.
<https://doi.org/10.1016/j.joep.2018.02.002>
- Burson, K. A., & Gershoff, A. D. (2015). Marketing actions that influence estimates of others also shape identity. *Journal of Consumer Psychology*.
<https://doi.org/10.1016/j.jcps.2015.01.008>
- Cadario, R., & Chandon, P. (2018). Which Healthy Eating Nudges Work Best? A Meta-Analysis of Field Experiments. *Marketing Science (Forthcoming)*.
<https://doi.org/10.2139/ssrn.3090829>
- Campbell, M. C., Mohr, G. S., & Verlegh, P. W. J. (2013). Can disclosures lead consumers to resist covert persuasion ? The important roles of disclosure timing and type of response. *Journal of Consumer Psychology*, 23(4), 483–495.
<https://doi.org/10.1016/j.jcps.2012.10.012>
- Cialdini, R. B., & Griskevicius, V. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Consumer Research*, 35(3), 472–482. <https://doi.org/10.1086/586910>
- Felsen, G., Castelo, N., & Reiner, P. B. (2013). Decisional enhancement and autonomy: public attitudes towards overt and covert nudges. *Judgement and Decision Making*, 8(3), 202–213.
- Finkelstein, S. R., & Fishbach, A. (2010). When Healthy Food Makes You Hungry. *Journal of Consumer Research*, 37(3), 357–367. <https://doi.org/10.1086/652248>
- Friestad, M., & Wright, P. (1994). The Persuasion Knowledge Model: How People Cope with Persuasion Attempts. *Journal of Consumer Research, Inc.*, 2, 1–31.

- Gaio, V., Antunes, L., Namorado, S., Barreto, M., Gil, A., Kyslaya, I., ... Matias, C. (2017). Prevalence of overweight and obesity in Portugal: Results from the First Portuguese Health Examination Survey (INSEF 2015). *Obesity Research & Clinical Practice*. <https://doi.org/10.1016/j.orcp.2017.08.002>
- Garlin, F. V., & Owen, K. (2006). Setting the tone with the tune: A meta-analytic review of the effects of background music in retail settings. *Journal of Business Research*, 59, 755–764. <https://doi.org/10.1016/j.jbusres.2006.01.013>
- Glanz, K., Bader, M. D. M., & Iyer, S. (2012). Retail Grocery Store Marketing Strategies and Obesity - An Integrative Review. *American Journal of Preventive Medicine*, 42(5), 503–512. <https://doi.org/10.1016/j.amepre.2012.01.013>
- Groenland, E. A. G., & Schoormans, J. P. L. (1994). Comparing Mood-Induction and Affective Conditioning as Mechanisms Influencing Product Evaluation and Product Choice. *Psychology & Marketing*, 11(2), 183–197.
- Gustafsson, A. (2012). Let the music play or not: The influence of background music on consumer behavior. *Journal of Retailing and Consumer Services*, 19, 553–560. <https://doi.org/10.1016/j.jretconser.2012.06.010>
- Higgs, S. (2014). Social norms and their influence on eating behaviours. *Appetite*, 86, 38–44. <https://doi.org/10.1016/j.appet.2014.10.021>
- Hui, S. K., Bradlow, E. T., & Fader, P. S. (2009). Testing Behavioral Hypotheses Using an Integrated Model of Grocery Store Shopping Path and Purchase Behavior. *Journal of Consumer Research*, 36(3), 478–493. <https://doi.org/10.1086/599046>
- Jonge, P. De, Zeelenberg, M., & Verlegh, P. W. J. (2018). Putting the public back in behavioral public policy. *Behavioural Public Policy*, (August). <https://doi.org/10.1017/bpp.2018.23>
- Khan, U., & Dhar, R. (2006). Licensing Effect in Consumer Choice. *Journal of Marketing Research*, XLIII, 259–266.

- Kleef, E. Van, Otten, K., & Trijp, H. C. M. Van. (2012). Healthy snacks at the checkout counter: A lab and field study on the impact of shelf arrangement and assortment structure on consumer choices. *BMC Public Health*.
- Knöferle, K. M., Knöferle, P., & Velasco, C. (2016). Multisensory Brand Search: How the Meaning of Sounds Guides Consumers' Visual Attention. *Journal of Experimental Psychology: Applied*, 22, 196–210.
- Krijnen, J., Tannenbaum, D., & Fox, C. R. (2017). Choice architecture 2.0: Behavioral policy as an implicit social interaction. *Behavioral Science & Policy*, 3(2), 1–18. <https://doi.org/10.1353/bsp.2017.0010>
- Kroese, F. M., Marchiori, D. R., & Ridder, D. T. D. de. (2015). Nudging healthy food choices: a field experiment at the train station. *Journal of Public Health*, 1–5. <https://doi.org/10.1093/pubmed/fdv096>
- Laran, J., & Buechel, E. V. A. (2016). Mental Resources Increase Preference for Dissimilar Experiences. *Journal of the Association for Consumer Research*, 2(1), 123–135.
- Loewenstein, G., Bryce, C., Hagmann, D., & Rajpal, S. (2015). Warning: You are about to be nudged. *Behavioral Science & Policy*, 1(1), 35–42.
- Maas, J., Ridder, D. T. D. De, Vet, E. De, & Wit, J. B. F. de. (2011). Do distant foods decrease intake? The effect of food accessibility on consumption. *Psychology & Health*, (November 2014), 37–41. <https://doi.org/10.1080/08870446.2011.565341>
- Malhotra, N. K. (2009). *Marketing Research - An Applied Orientation* (6th ed.). Pearson.
- Marchiori, D. R., Adriaanse, M. A., & Ridder, D. T. D. De. (2017). Unresolved questions in nudging research: Putting the psychology back in nudging. *Soc Personal Psychol Compass*, 1–13. <https://doi.org/10.1111/spc3.12297>
- Marktest. (2016). Portugueses dizem fazer uma alimentação saudável. Retrieved October 17, 2018, from <https://www.marktest.com/wap/a/n/id~214b.aspx>

- Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing Human Behavior to Targeting Automatic Processes. *Disease Prevention*, 337(September), 1492–1496.
- Meeker, D., Linder, J. A., Fox, C. R., Friedberg, M. W., Persell, S. D., Goldstein, N. J., ... Doctor, J. N. (2016). Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices: A Randomized Clinical Trial. *American Medical Association*, 315(6), 562–570. <https://doi.org/10.1001/jama.2016.0275>
- Michel, A., Baumann, C., & Gayer, L. (2017). Thank you for the music – or not? The effects of in-store music in service settings. *Journal of Retailing and Consumer Services*, 36, 21–32. <https://doi.org/10.1016/j.jretconser.2016.12.008>
- Milliman, R. E. (1982). Using Background Music to Affect the Behavior of Supermarket Shoppers. *American Marketing Association*, 46(3), 86–91.
- Moorman, C. (1990). The Effects of Stimulus and Consumer Characteristics on the Utilization of Nutrition Information. *Journal of Consumer Research, Inc.*, 17, 362–374.
- Moorman, C., & Matulich, E. (1993). A Model of Consumers' Preventive Health Behaviors: The Role of Health Motivation and Health Ability. *Journal of Consumer Research, Inc.*, 20(September 1993).
- Mukhopadhyay, A., & Johar, G. V. (2007). Tempted or Not? The Effect of Recent Purchase History on Responses to Affective Advertising. *Journal of Consumer Research, Inc.*, 33, 445–453.
- North, A. C., Hargreaves, D. J., & Mckendrick, J. (1999). The Influence of In-Store Music on Wine Selections. *Journal of Applied Psychology*, 84(2), 271–276.
- Payne, C. R., Niculescu, M., Just, D. R., & Kelly, M. P. (2014). Shopper marketing nutrition interventions. *Physiology & Behavior*. <https://doi.org/10.1016/j.physbeh.2014.03.029>
- Prinsen, S., Ridder, D. T. D. De, & Vet, E. De. (2013). Eating by example. Effects of environmental cues on dietary decisions. *Appetite*, 70, 1–5.

<https://doi.org/10.1016/j.appet.2013.05.023>

Provencher, V., Polivy, J., & Herman, C. P. (2009). Perceived healthiness of food. If it's healthy, you can eat more! *Appetite*, 52, 340–344.

<https://doi.org/10.1016/j.appet.2008.11.005>

Ridder, D. De. (2014). Nudging for beginners: A shortlist of issues in urgent need of research. *The European Health Psychologist*, 1(1), 2–6.

Román, S., Sánchez-Siles, L. M., & Siegrist, M. (2017). The importance of food naturalness for consumers: Results of a systematic review. *Trends in Food Science & Technology*.

<https://doi.org/10.1016/j.tifs.2017.06.010>

Romero, M., & Biswas, D. (2016). Healthy-Left, Unhealthy-Right: Can Displaying Healthy Items to the Left (versus Right) of Unhealthy Items Nudge Healthier Choices? *Journal of Consumer Research*, 43(1), 103–112.

Roschk, H., Loureiro, S., & Breitsohl, J. (2017). Calibrating 30 Years of Experimental Research: A Meta-Analysis of the Atmospheric Effects of Music, Scent, and Color.

Journal of Retailing, 93(2), 228–240. <https://doi.org/10.1016/j.jretai.2016.10.001>

Rozin, P., Scott, S. E., & Dingley, M. (2011). Nudge to Nobesity I: Minor Changes in Accessibility Decrease Food Intake Nudge to Nobesity I: Minor Changes in Accessibility Decrease Food, 6, 323–332.

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research Methods for Business Students* (7th ed.). Pearson.

Sérgio, A., Correia, F., Medina, J. L., Carvalheiro, M., Almeida, M. D. V. de, & Dias, T. (2005). *Programa Nacional de Combate à Obesidade - Circular Normativa*.

Sherif, M. (1936). *The Psychology of Social Norms*. Harper & Brothers Publishers.

Spence, C., Puccinelli, N. M., Grewal, D., & Roggeveen, A. L. (2014). Store Atmospherics: A Multisensory Perspective. *Psychology & Marketing*, 31(7), 472–488.

<https://doi.org/10.1002/mar>

- Steffel, M., Williams, E. F., & Pogacar, R. (2016). Ethically Deployed Defaults: Transparency and Consumer Protection Via Disclosure and Preference Articulation. *Journal of Marketing Research*, 53(5), 865–880.
- Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions About Health, Wealth and Happiness*.
- Triandis, H. C., & Brislin, R. W. (1984). Cross-Cultural Psychology. *American Psychologist*, 39(9), 1006–1016.
- van Kampen, H. S. (2018). The principle of consistency and the cause and function of behaviour. *Behavioural Processes*. <https://doi.org/10.1016/j.beproc.2018.12.013>
- Wansink, B. (2017). Healthy Profits: An Interdisciplinary Retail Framework that Increases the Sales of Healthy Foods. *Journal of Retailing*, 93(1), 65–78. <https://doi.org/10.1016/j.jretai.2016.12.007>
- Wansink, B., Soman, D., & Herbst, K. C. (2017). Larger partitions lead to larger sales: Divided grocery carts alter purchase norms and increase sales. *Journal of Business Research*. <https://doi.org/10.1016/j.jbusres.2016.06.023>
- WHO (2018). Controlling the global obesity epidemic. Retrieved October 15, 2018, from <http://www.who.int/nutrition/topics/obesity/en/>
- Wilcox, K., Vallen, B., Block, L., & Fitzsimons, G. J. (2009). Vicarious Goal Fulfillment: When the Mere Presence of a Healthy Option Leads to an Ironically Indulgent Decision. *Journal of Consumer Research, Inc.*, 36(3), 380–393. <https://doi.org/10.1086/599219>
- Wisdom, J., Downs, J. S., & Loewenstein, G. (2010). Promoting Healthy Choices: Information versus Convenience. *American Economic Journal*, 2(April), 164–178.
- Wood, W., & Quinn, J. M. (2003). Forewarned and Forearmed? Two Meta-Analytic Syntheses of Forewarnings of Influence Appeals. *Psychological Bulletin*, 129(1), 119–138.

<https://doi.org/10.1037/0033-2909.129.1.119>

Zwebner, Y., Lee, L., & Goldenberg, J. (2013). The temperature premium: Warm temperatures increase product valuation. *Journal of Consumer Psychology*, 24(2), 251–259.

<https://doi.org/10.1016/j.jcps.2013.11.003>

Appendix

Health Motivation (adapted): (7) Strongly Agree; (1) Strongly Disagree

I try to prevent health problems before I feel any symptoms.

[Tento prevenir problemas de saúde antes de sentir quaisquer sintomas.ⁱ]

I am concerned about health hazards and try to act to prevent them.

[Preocupo-me com perigos para a saúde e tento agir no sentido de os prevenir.]

I try to protect myself against health hazards I hear about.

[Tento proteger-me contra riscos de saúde sobre os quais ouço falar.]

I don't worry about health hazards until they become a problem to me or to someone close to me.

[Não me preocupo com perigos para a saúde até eles se tornarem um problema para mim ou para alguém próximo de mim.]

There are so many things that can hurt you these days. I'm not going to worry about them.

[Existem tantas coisas que podem afetar-nos hoje em dia. Não vou preocupar-me com elas.]

I worry about health hazards, but life is too short, I will not worry about it until its needed.

[Preocupo-me sobre perigos para a saúde, mas a vida é demasiado curta, não vou preocupar-me com eles até ser necessário.]

I'd rather enjoy life than try to make sure I'm not exposing myself to a health hazard.

[Prefiro aproveitar a vida em vez de garantir que não me exponho a perigos para a saúde.]

ⁱ Original language.